

FEMALE-TARGETED FLORAL
LURE FOR THE CLICK BEETLE
AGRIOTES USTULATUS
(COLEOPTERA: ELATERIDAE)

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Click beetles are generally thought to use classical sex pheromones, which are emitted by the females, and responded to by the males. *Agriotes ustulatus* is among the most important pest click beetles in Europe.



After Furlan & Tóth,
2007, IOBC/wprs Bull.,
30:19-25.

Click beetles are generally thought to use classical sex pheromones, which are emitted by the females, and responded to by the males. *Agriotes ustulatus* is among the most important pest click beetles in Europe. The female-emitted sex pheromone has been characterized as (*E,E*)-farnesyl acetate, and this compound attracts large numbers of males into traps (refer to i.e. Tóth et al., 2003 and references therein).

- *ustulatus* catch
- no catch



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30:19-25.

As a next step in the trap development for *A. ustulatus*, the need arose for traps using female-targeted baits attracting females also.



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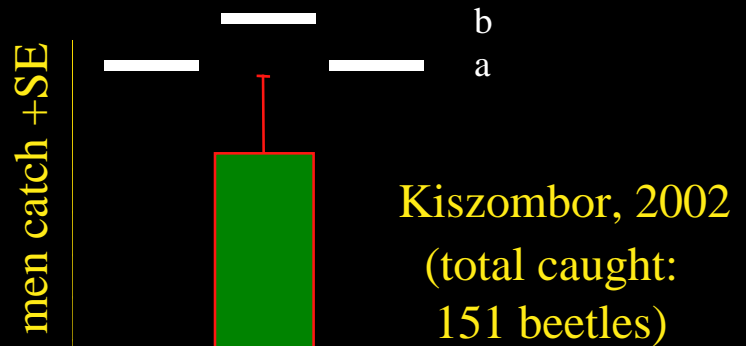


Since *A. ustulatus* adults can frequently be seen visiting flowers for feeding, we supposed that the localization of flowers is assisted by chemical stimuli of floral scents.

Floral compounds constituting such scents, if characterized, could be exploited to develop a female-targeted lure.

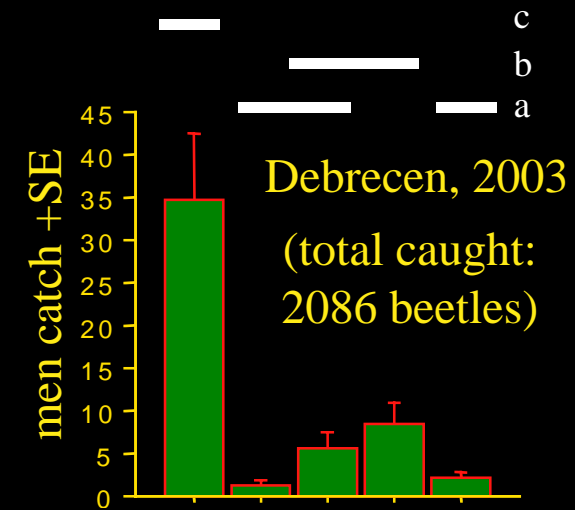
Chance findings

Regular *A. ustulatus* catches in tests aimed at other insects – in traps baited with synthetic floral compounds – appeared to support this hypothesis.

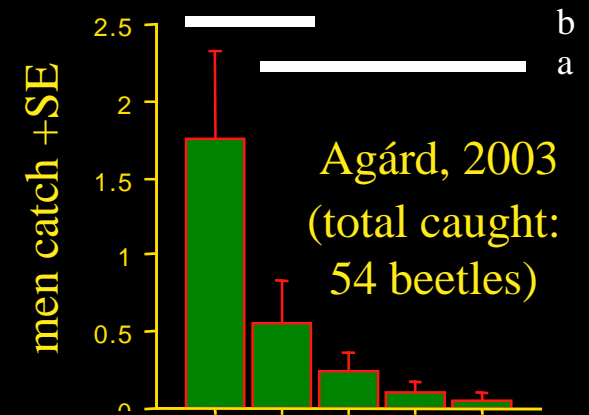


- yellow colour
- *Diabrotica*
- pheromone bait
- 4-methoxy cinnamaldehyde
- indol

○ = absent ● = present



- 4-methoxy cinnamaldehyde ○ ○ ● ● ○
- indole ○ ● ○ ● ○
- (E)-anethole ● ○ ○ ○ ○

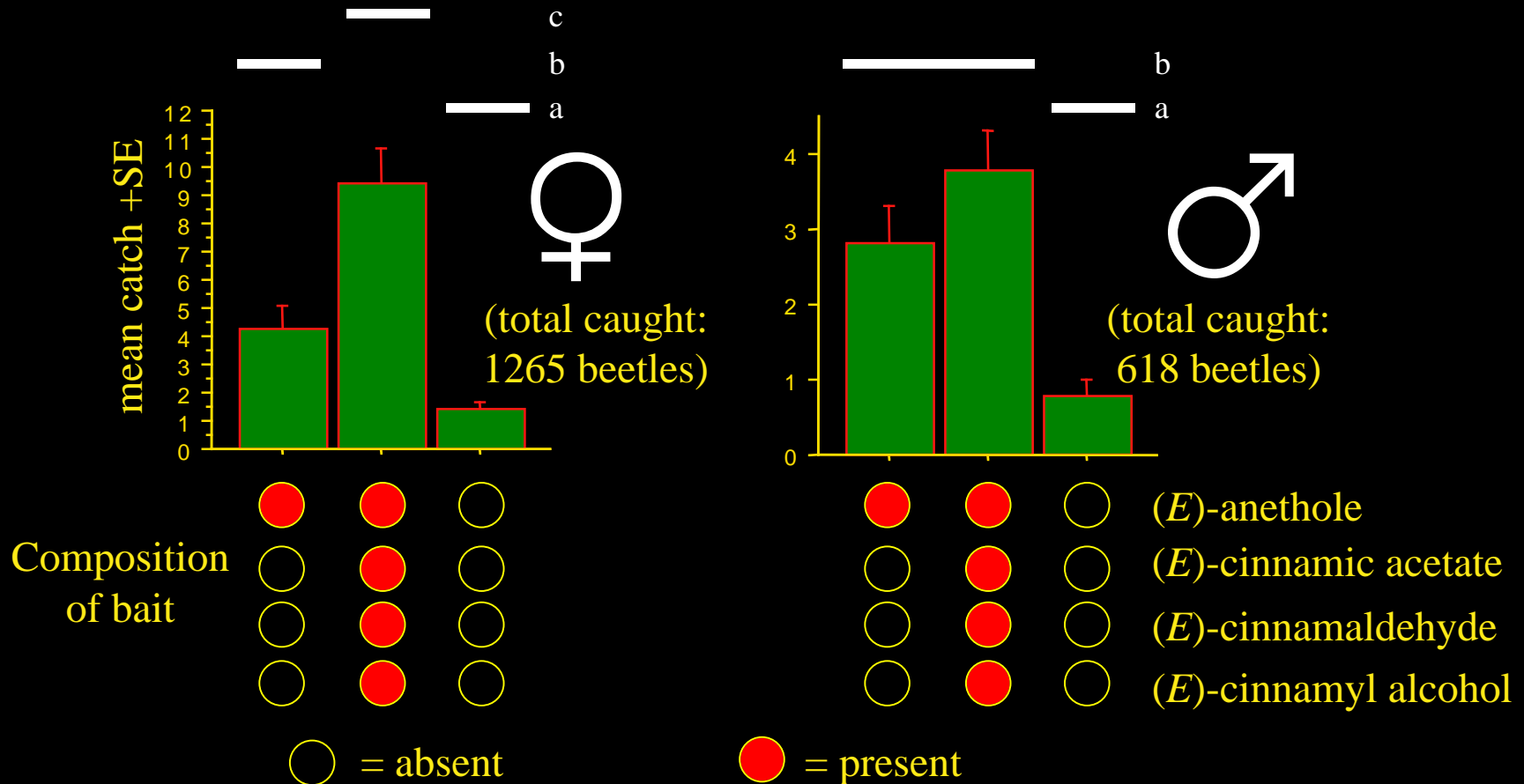


- 4-methoxy cinn.ald. ○ ○ ● ● ○
- indole ○ ● ○ ● ○
- (E)-anethole ● ○ ○ ○ ○

Search for most efficient blend

After having screened several floral combinations we concluded as preliminary result that the addition of cinnamic compounds to (*E*)-anethole increased female catches.

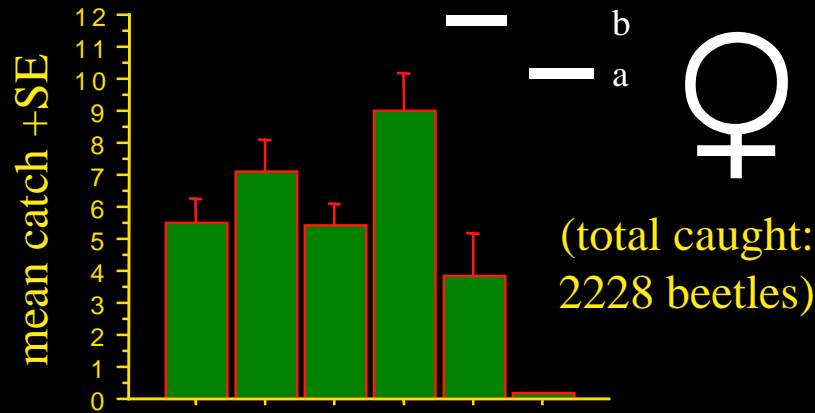
Zingales, 2004



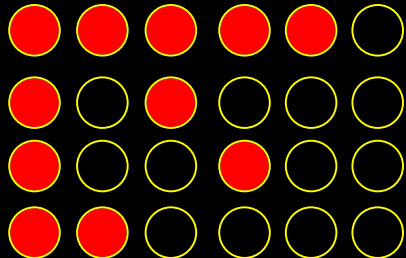
Search for most efficient blend

When cinnamic compounds were added singly, this also increased catches. Numerically highest catches were observed with the blend of (*E*)-cinnamaldehyde plus (*E*)-anethole. In further tests this bait composition was used as the basic female-targeted bait.

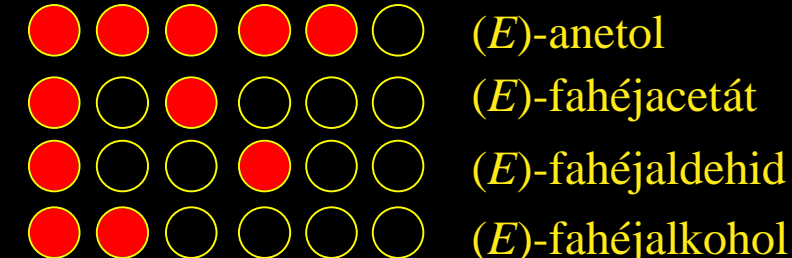
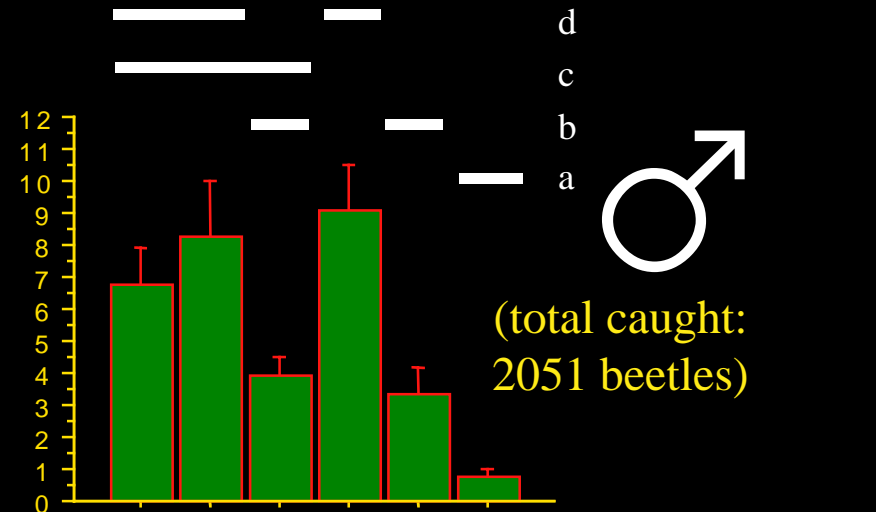
Debrecen, 2006



Composition of bait

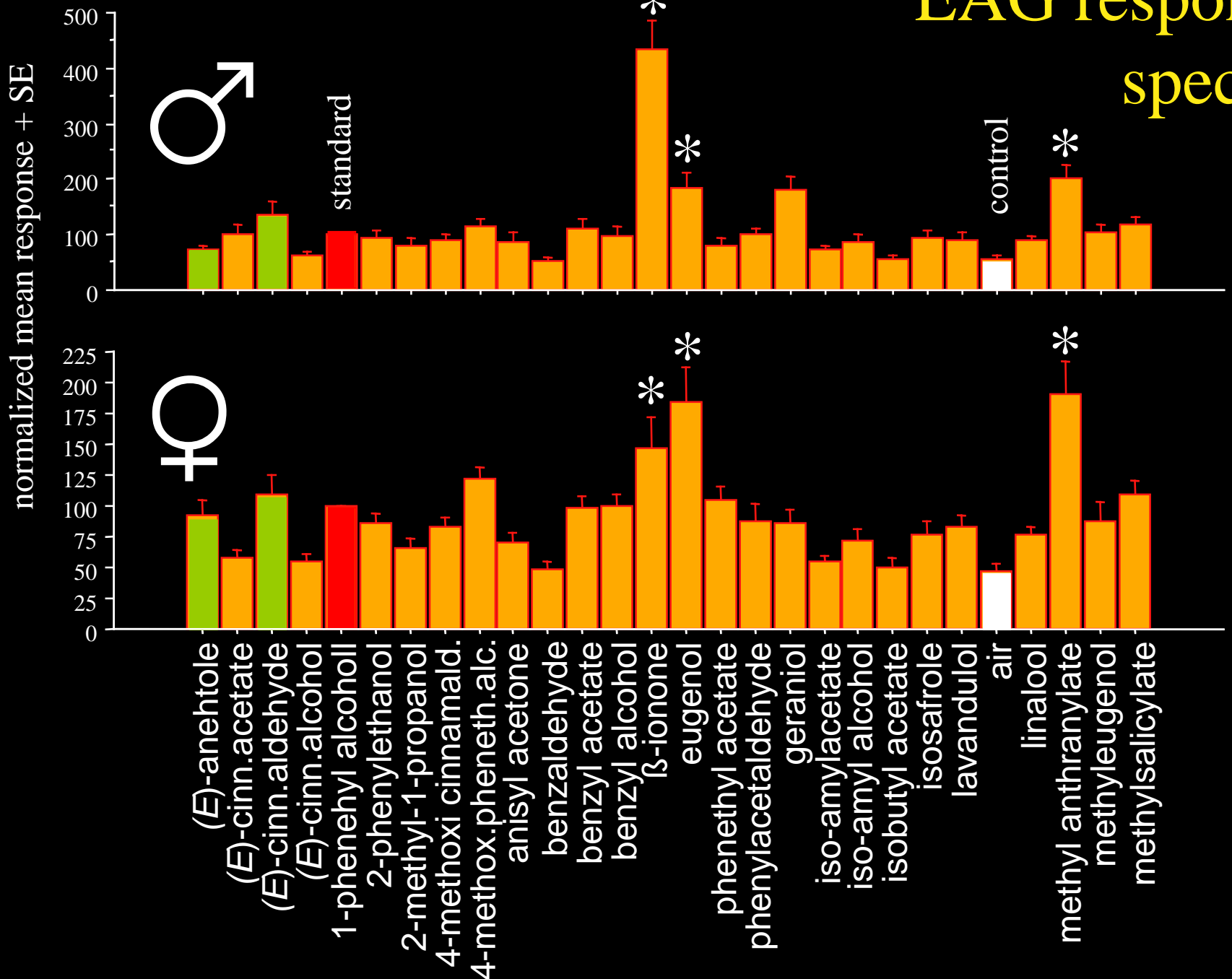


○ = absent



● = present

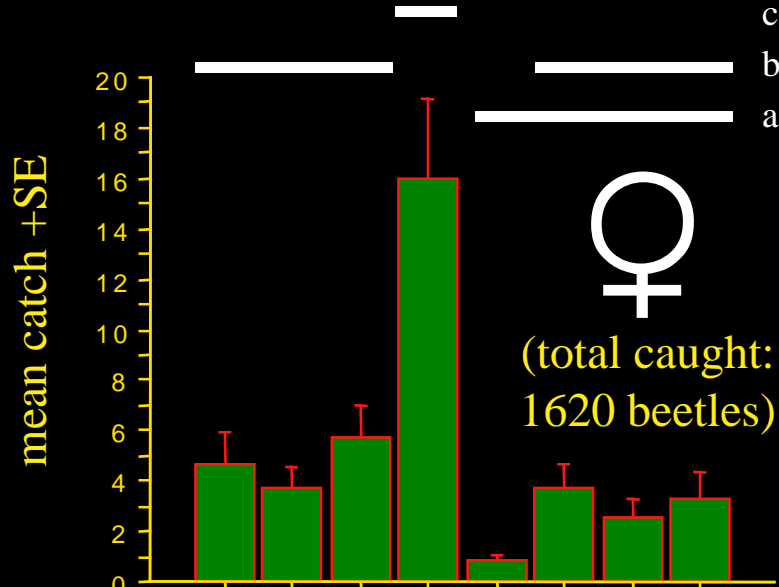
EAG response spectra



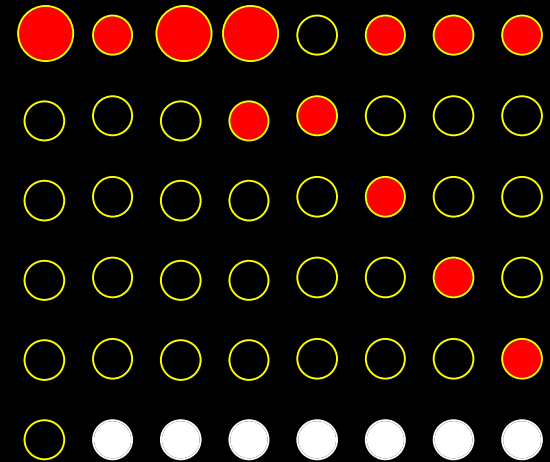
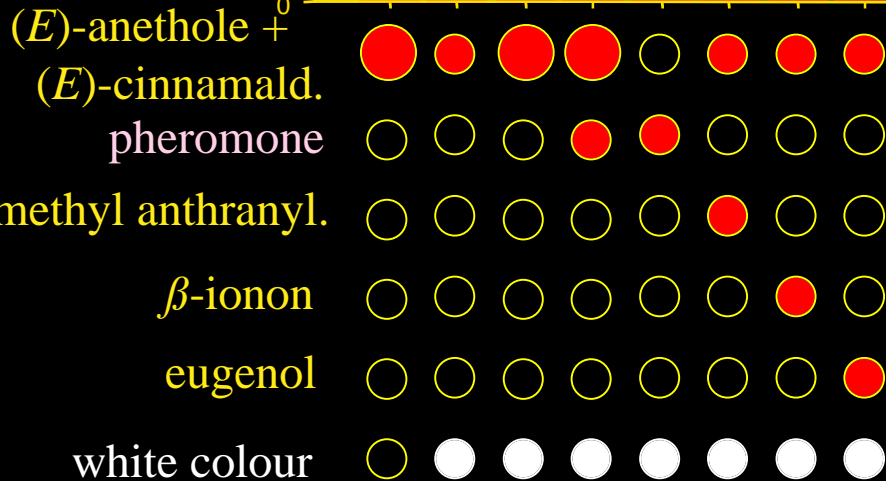
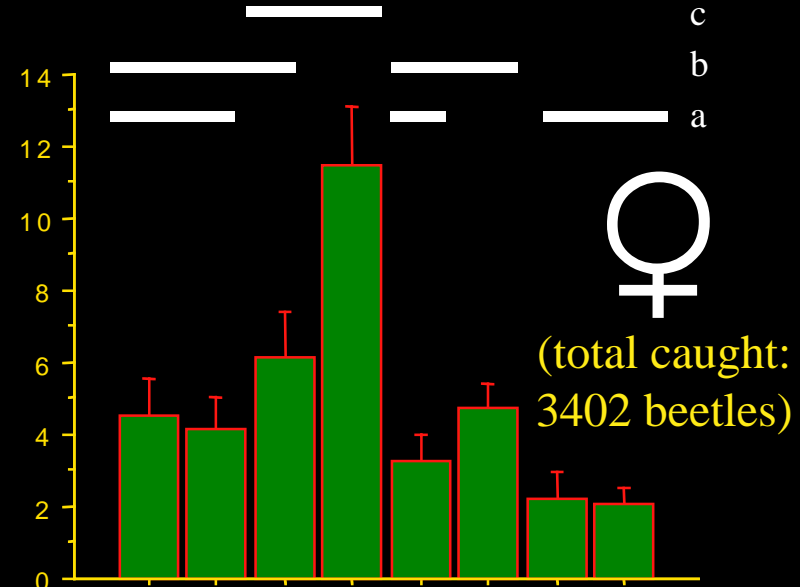
Compounds evoking large EAG responses

In FEMALES:

Debrecen, 2007



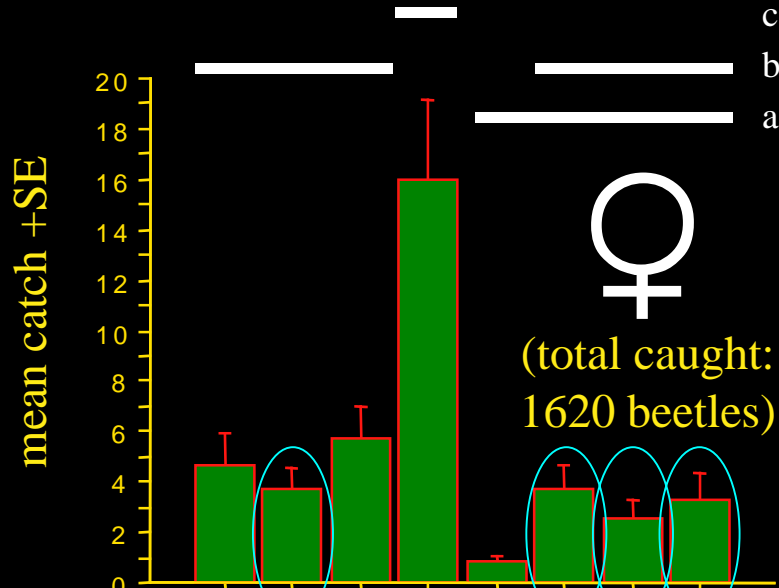
Veneto, 2007



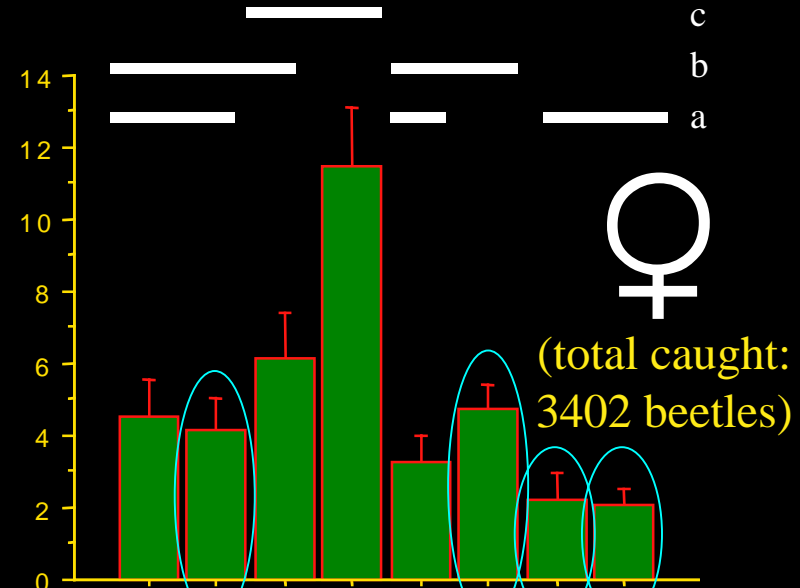
Compounds evoking large EAG responses

Their addition does not influence catch of basic bait.

Debrecen, 2007



Veneto, 2007



(E)-anethole +
(E)-cinnamald.

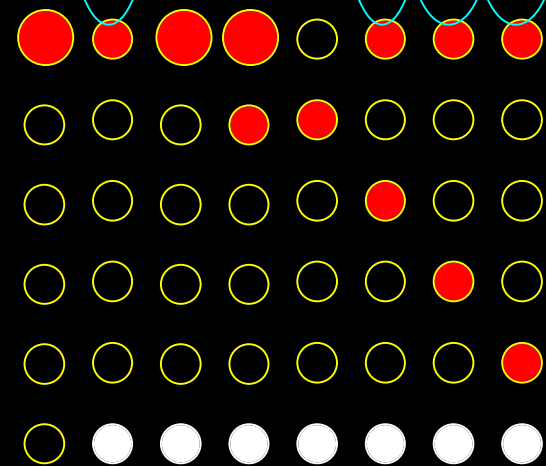
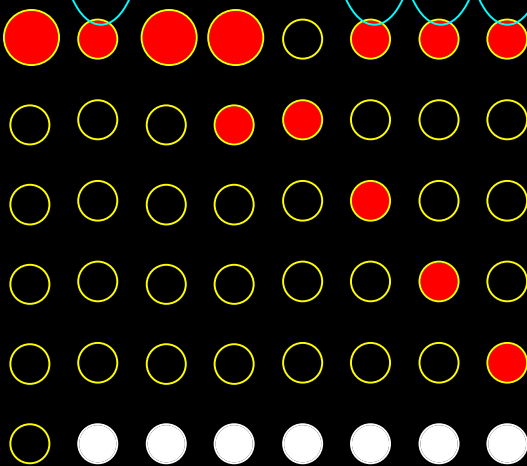
pheromone

methyl anthranyl.

β -ionon

eugenol

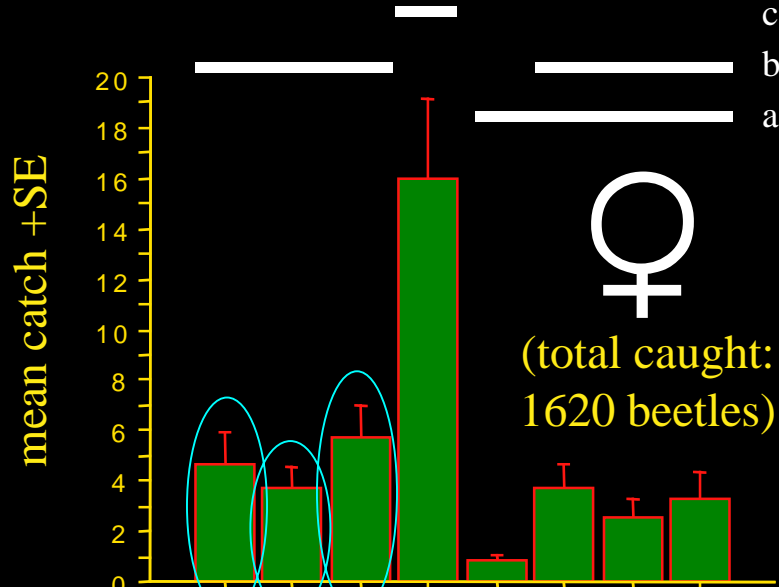
white colour



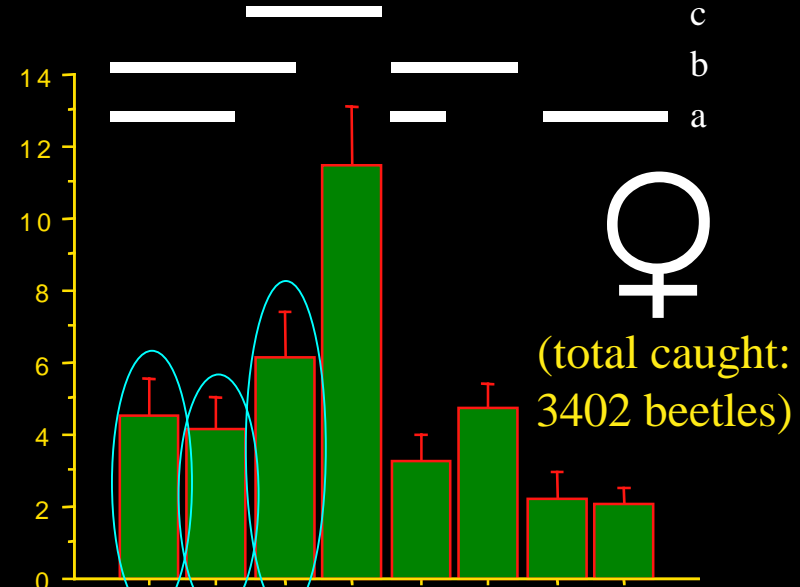
Dose of basic bait

Triplicating the dose has no dramatic effect.

Debrecen, 2007



Veneto, 2007



(*E*)-anethole +
(*E*)-cinnamald.

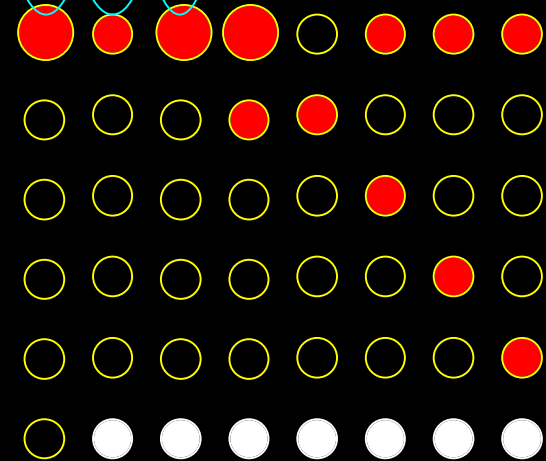
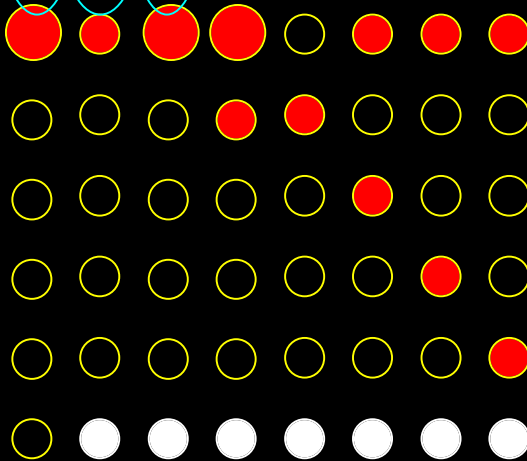
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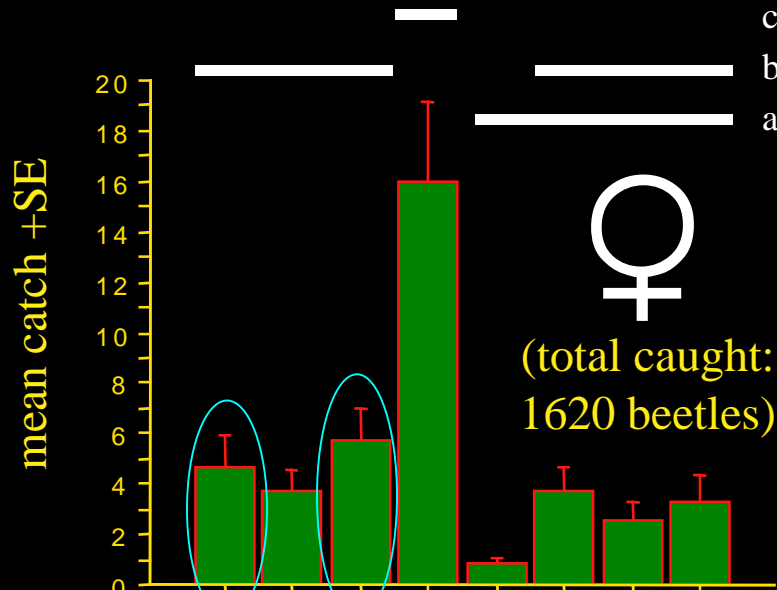
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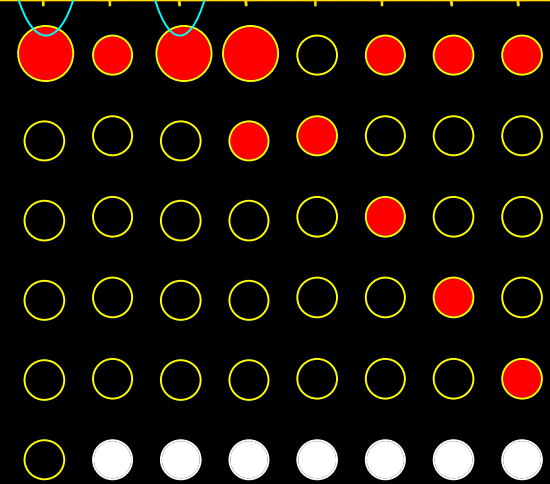
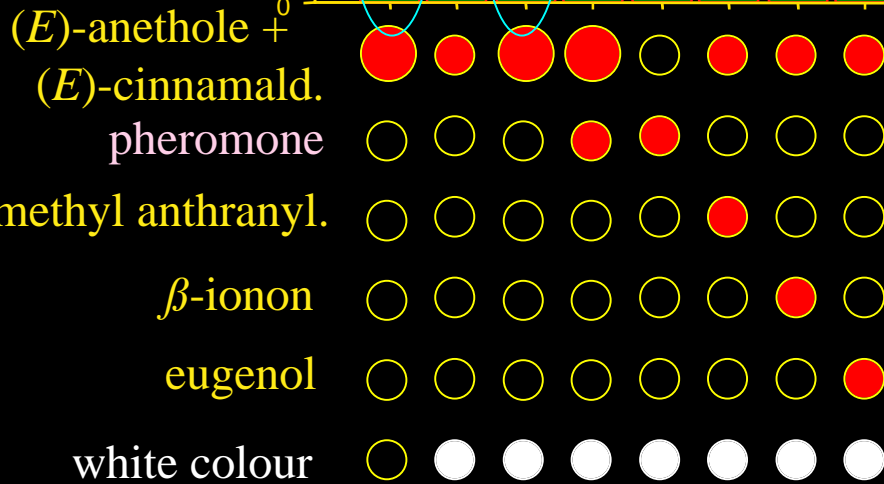
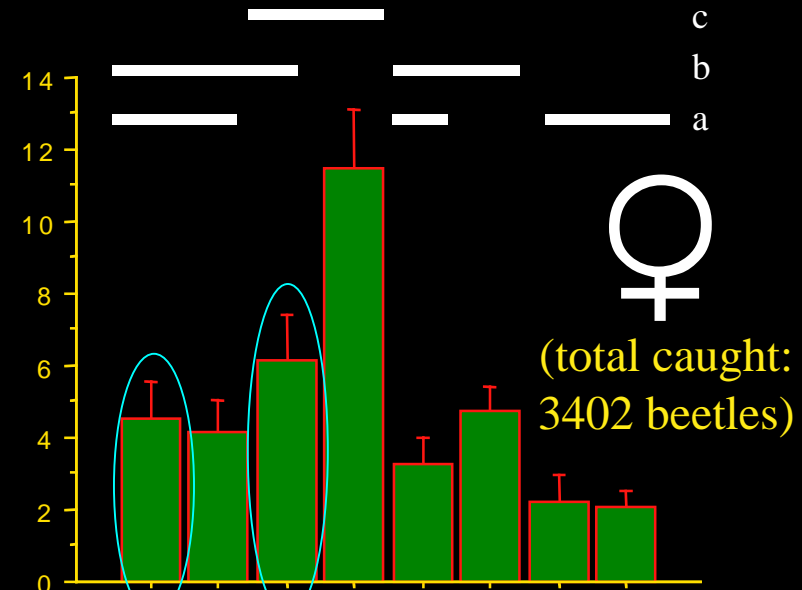
Influence of white as visual stimulus

The effect of white colour is very weak as compared to the effect of chemical stimuli

Debrecen, 2007



Veneto, 2007

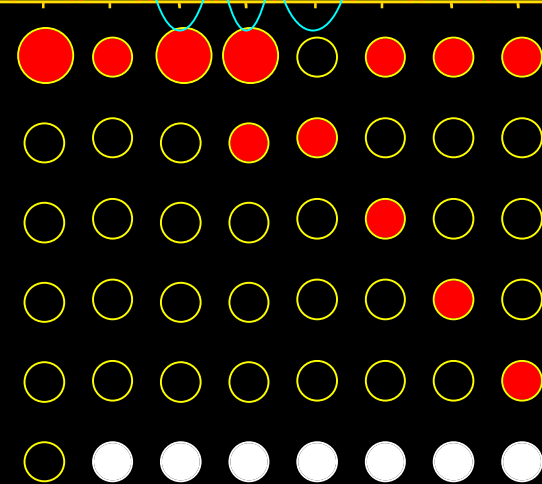
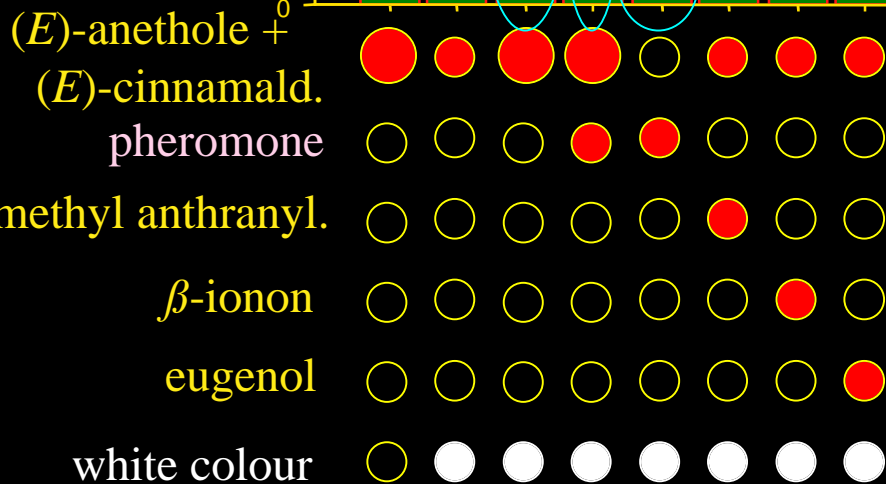
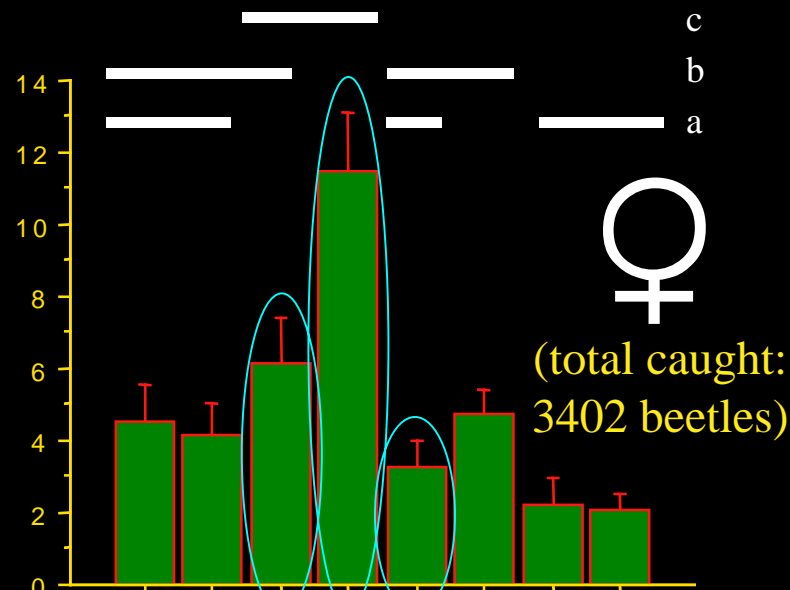
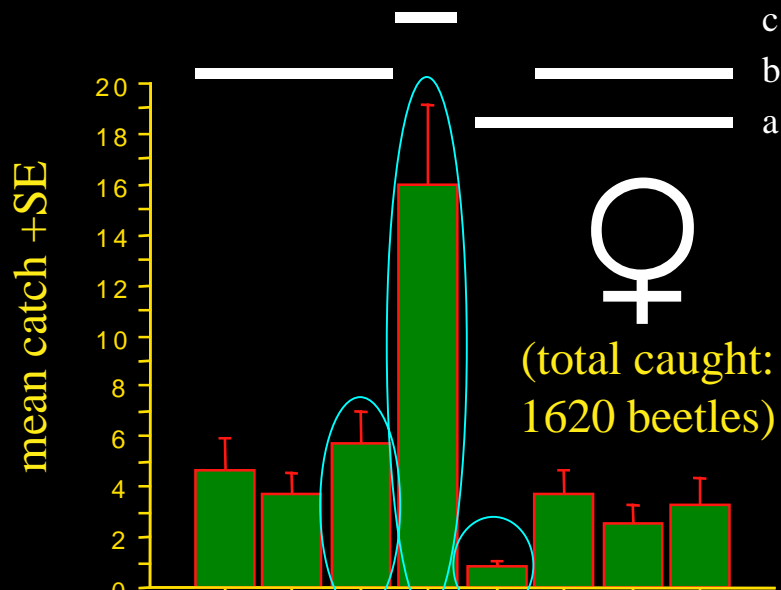


Interaction of floral and pheromonal lures

In presence of the pheromone the floral lure catches more females???

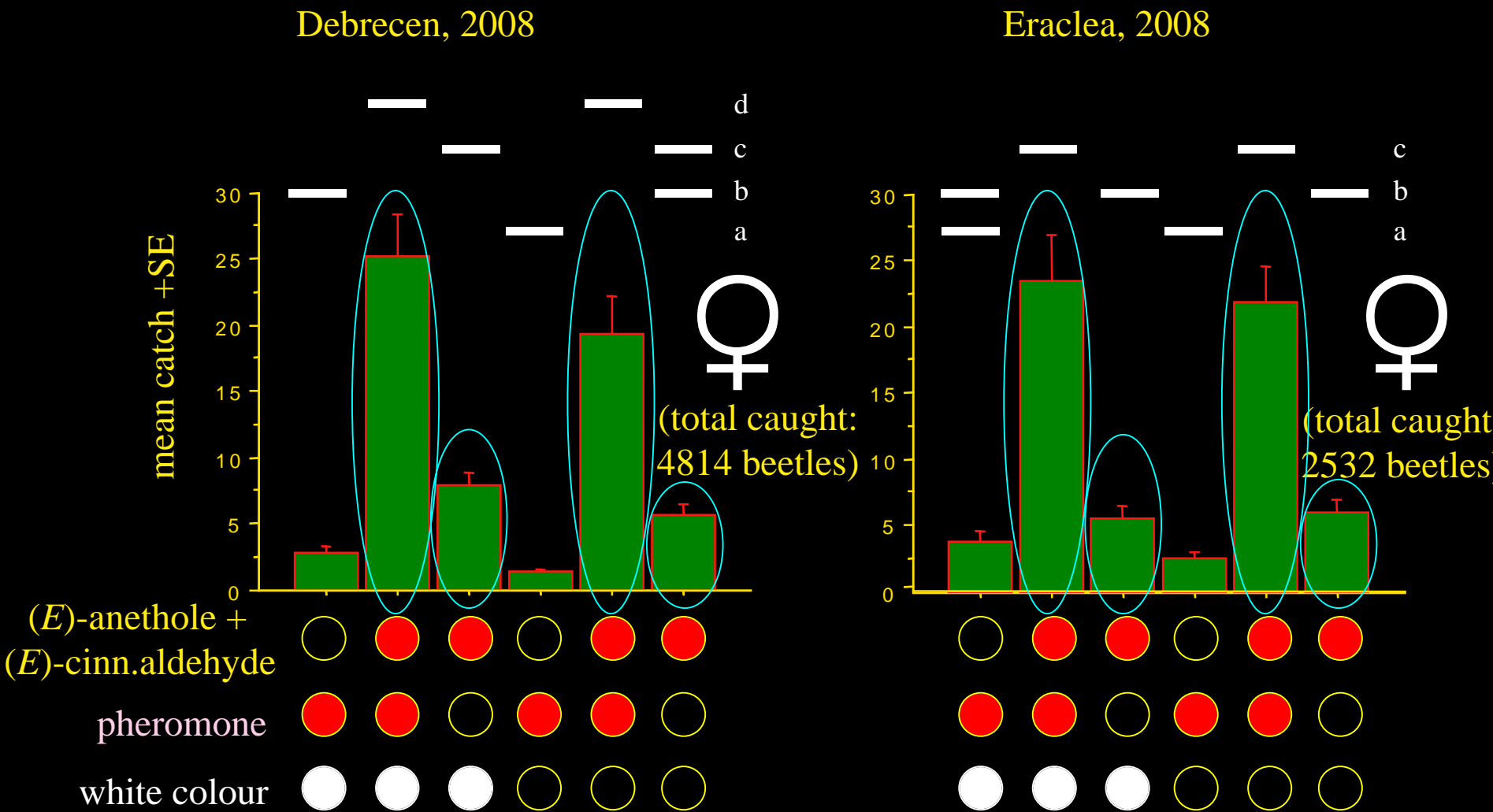
Debrecen, 2007

Veneto, 2007



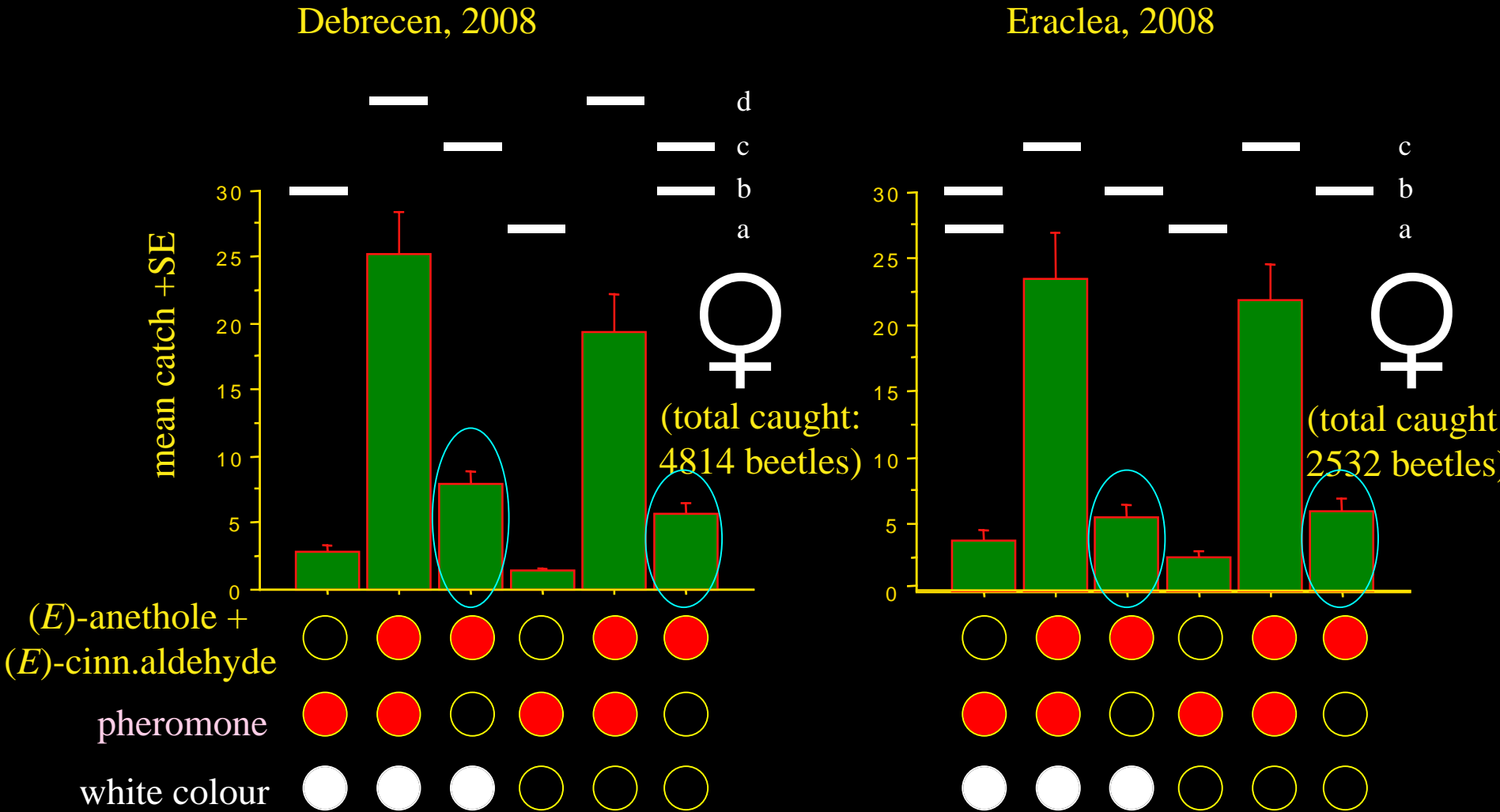
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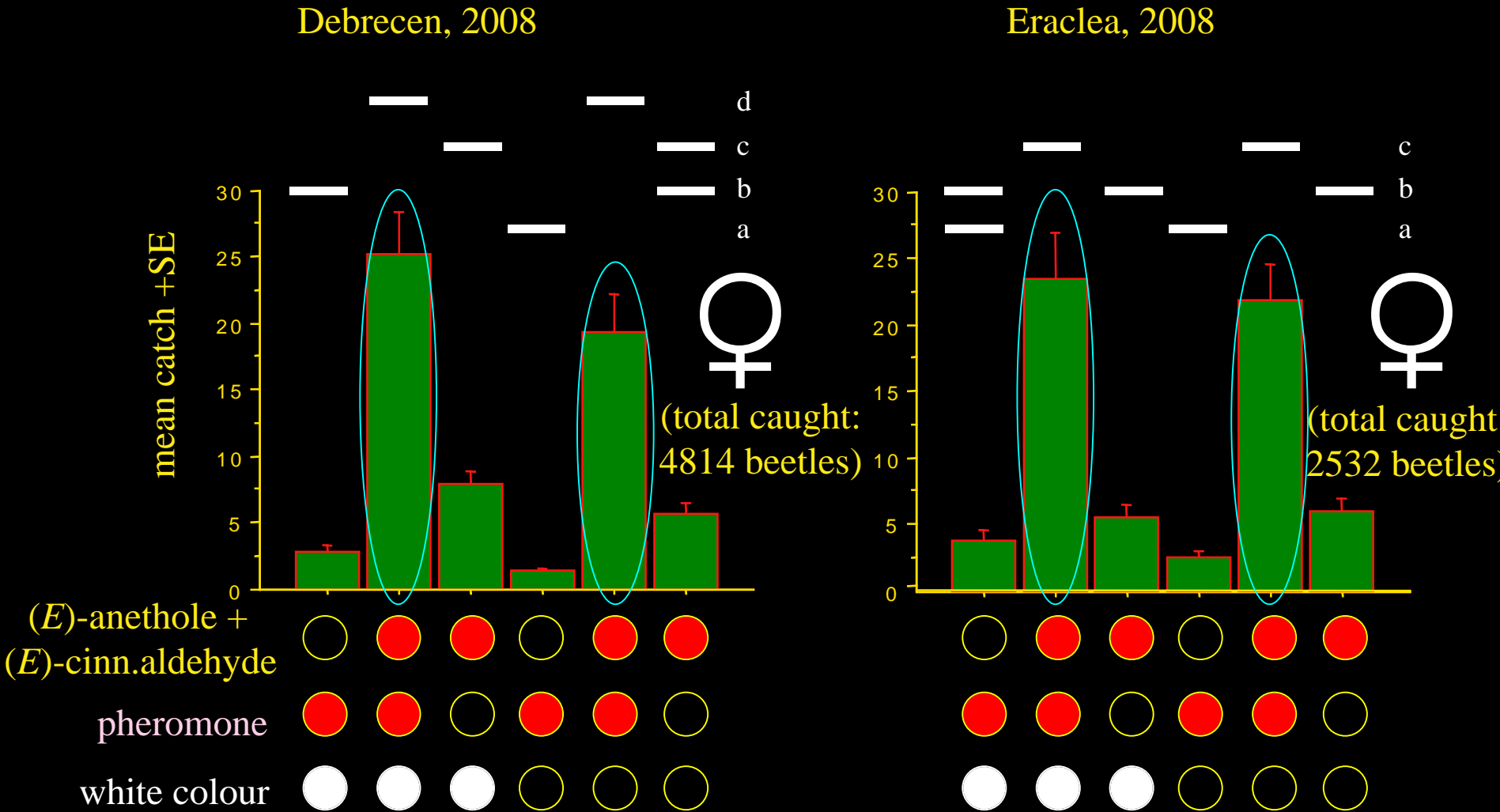
Influence of white as visual stimulus

The effect of white colour is still very moderate



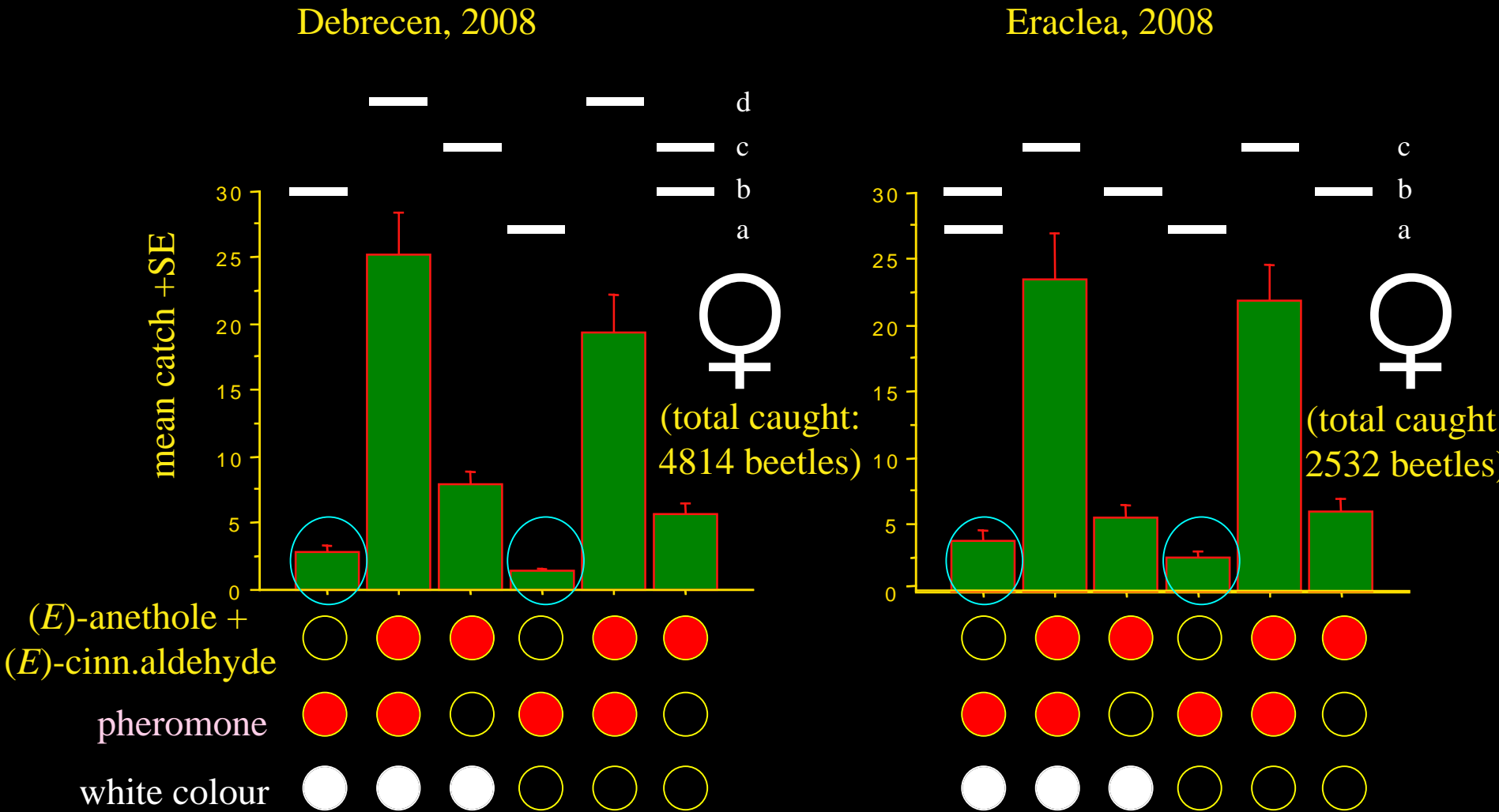
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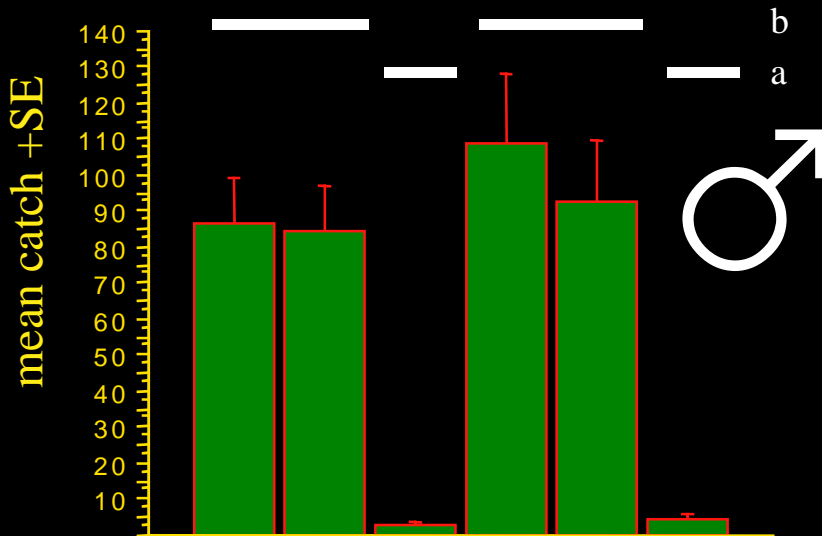


Interaction of floral and pheromonal lures

In MALES again the effect of the pheromone is dominant

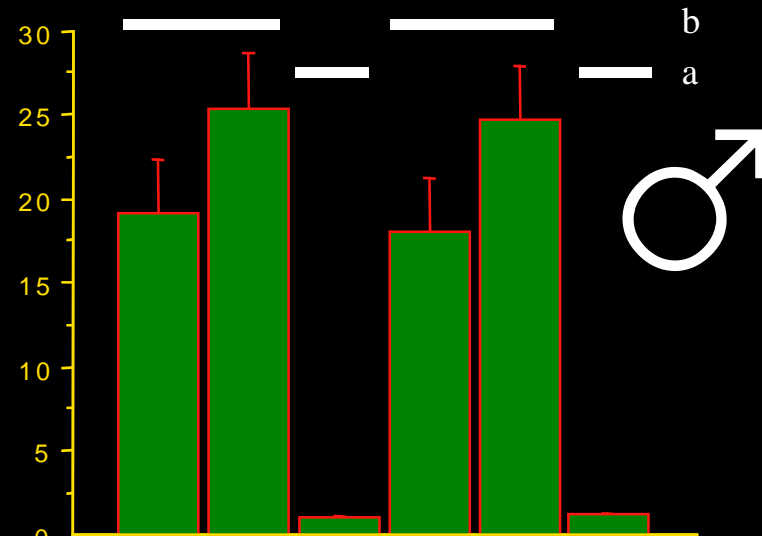
Debrecen, 2008

(total caught: 29511 beetles)



Eraclea, 2008

(total caught: 3591 beetles)



(E)-anethole + (E)-cinn.aldehyde

pheromone

white colour

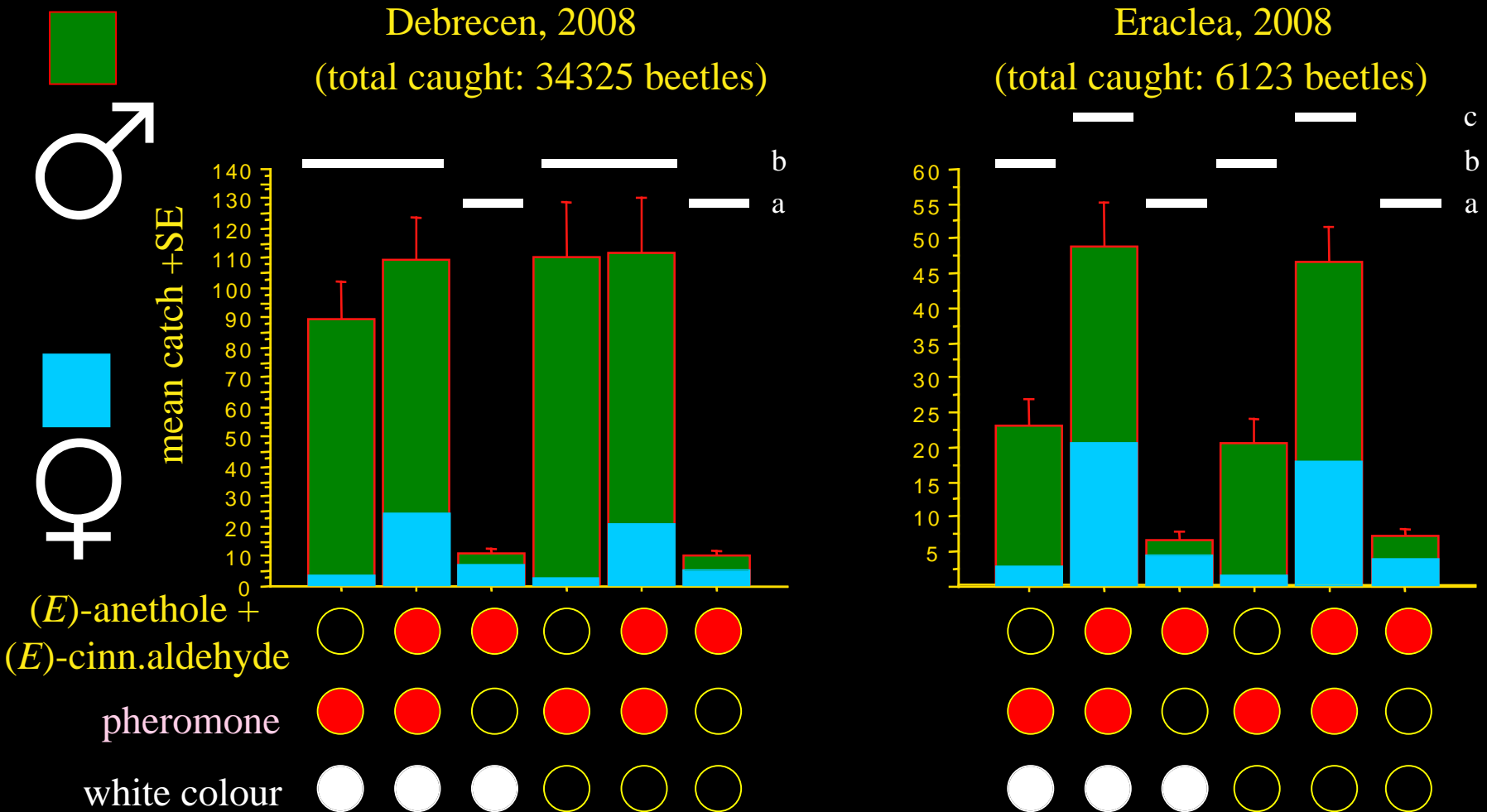
(E)-anethole + (E)-cinn.aldehyde

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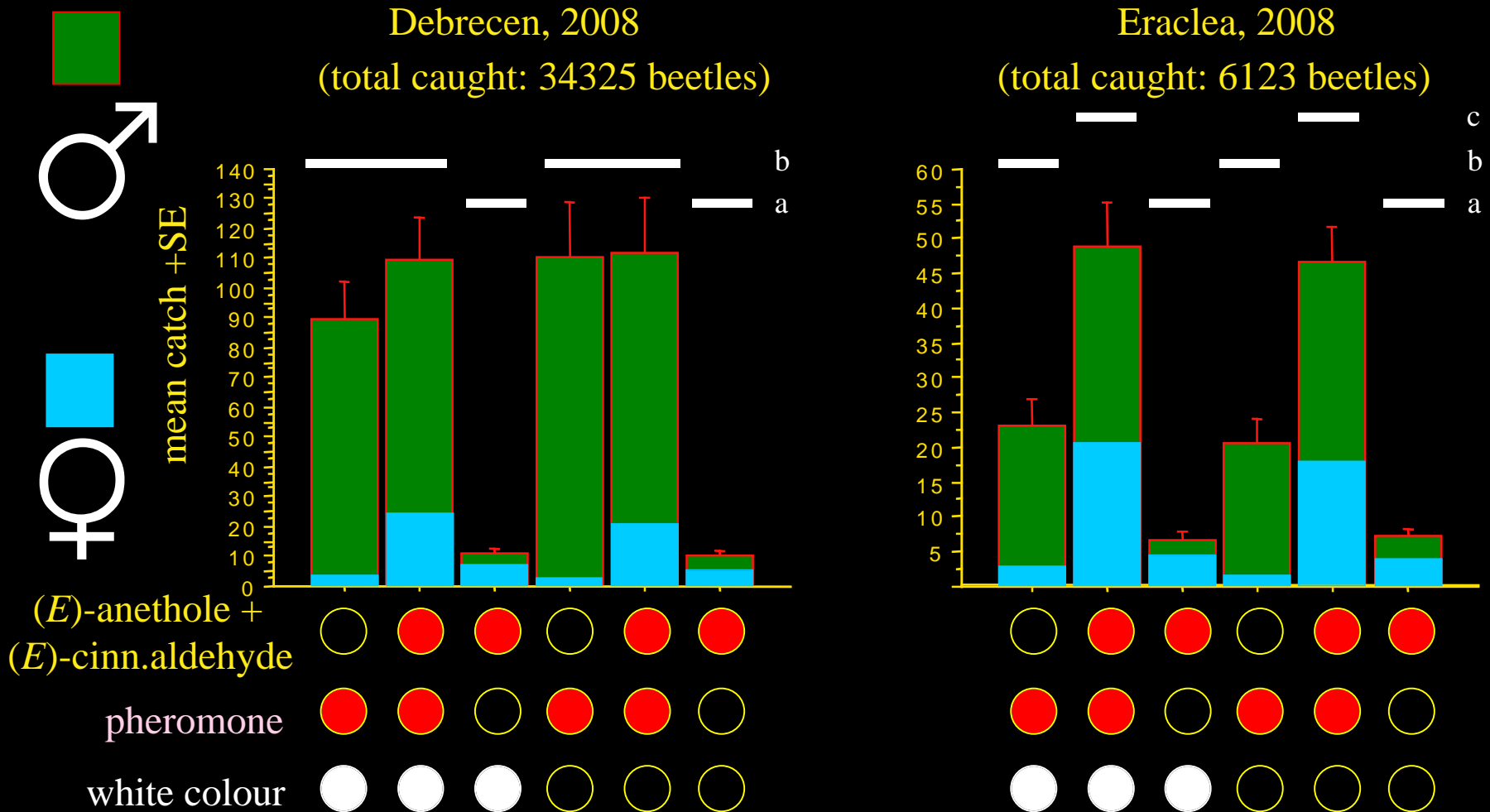
Floral and pheromone baits in the same trap

Most beetles specimens are caught in traps with both floral AND pheromonal baits



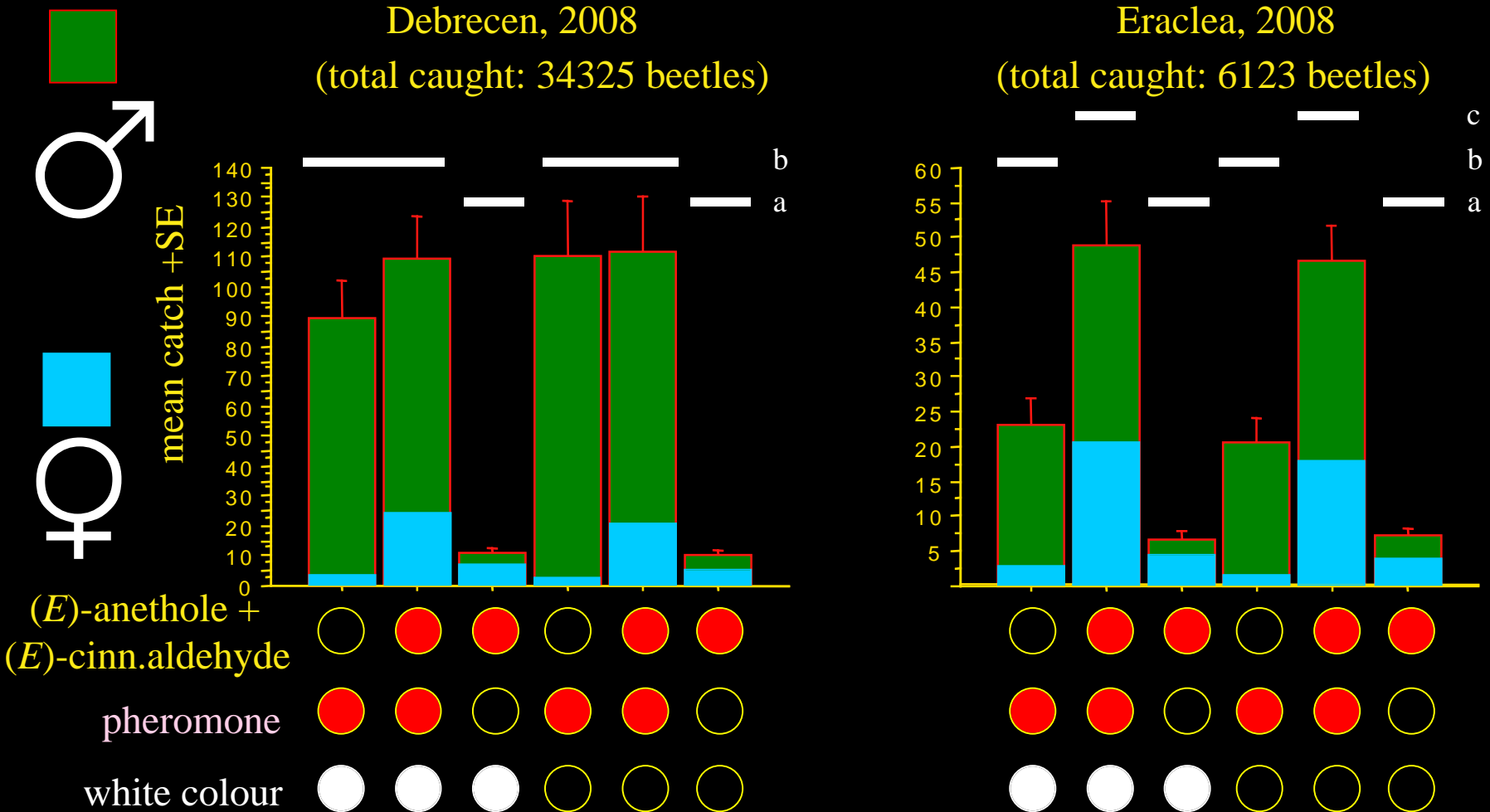
Floral and pheromone baits in the same trap

A similar phenomenon (i.e. that the presence of the pheromone increases the effect of floral bait on females) is unusual with sex pheromones



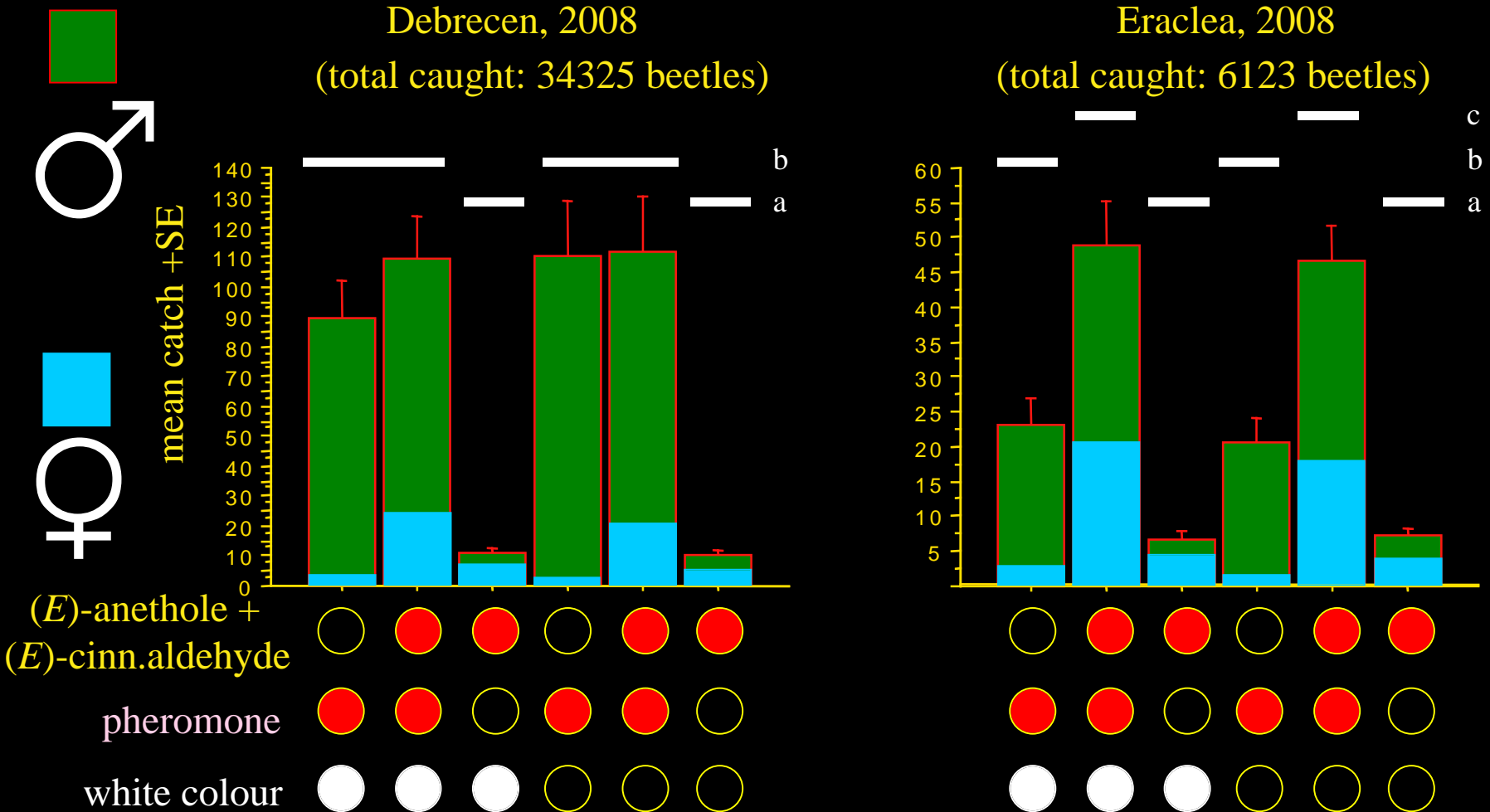
Floral and pheromone baits in the same trap

However, it is frequently reported with aggregation pheromones



Floral and pheromone baits in the same trap

This suggests that the pheromone of *A. ustulatus* is not a “classical” sex pheromone





Many thanks for
attention!

